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(REV 10-95)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

**TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. §371**

DCLERC 3

U.S. APPLICATION NO. (if known, see 37 CFR §1.5)

**10/070497**

INTERNATIONAL APPLICATION NO

INTERNATIONAL FILING DATE

PRIORITY DATE CLAIMED

PCT/EP00/08757

8 SEPTEMBER 2000

8 SEPTEMBER 1999

TITLE OF INVENTION

METHOD FOR E-MAIL COMMUNICATION, APPARATUS THEREFOR AND USE OF SAID METHOD AND APPARATUS FOR ELECTRONIC METERING AND FOR HOME AUTOMATION

APPLICANT(S) FOR DO/EO/US



VAN DALEN, Pieter, Adriaan

**Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:**

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. §371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. §371.
3. ☐ This express request to begin national examination procedures (35 U.S.C. §371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. §371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19<sup>th</sup> month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. §371(c)(2))
  - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☒ has been transmitted by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. §371(c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3))
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☒ have not been made and will not be made
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. §371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. §371(c)(4)).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. §371(c)(5)).

**Items 11. to 16. below concern document(s) or information included:**

11. ☐ An Information Disclosure Statement under 37 C.F.R. §§1.97 and 1.98
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. §§3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
 ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter
16. ☐ Other items or information:

U.S. APPLICATION NO (if known, see 37 CFR §1.52) <b>10/070497</b>		INTERNATIONAL APPLICATION NO <b>PCT/EP00/08757</b>		ATTORNEY'S DOCKET NUMBER <b>DCLERC 3</b>	
17. <input checked="" type="checkbox"/> The following fees are submitted:  <b>BASIC NATIONAL FEE ( 37 CFR §1.492 (a) (1) - (5)):</b>  Search Report has been prepared by the EPO or JPO..... \$890.00 International preliminary examination fee paid to USPTO (37 CFR §1.482)..... \$710.00 No international preliminary examination fee paid to USPTO (37 CFR §1.482) but international search fee paid to USPTO (37 CFR §1.445(a)(2))..... \$740.00 Neither international preliminary examination fee (37 CFR §1.482) nor international search fee (37 CFR §1.445(a)(2)) paid to USPTO..... \$1040.00 International preliminary examination fee paid to USPTO (37 CFR §1.482) and all claims satisfied provisions of PCT Article 33(2)-(4)..... \$100.00  <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>				<b>CALCULATIONS</b> PTO USE ONLY	
Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than months from the earliest claimed priority date (37 C.F.R. §1.492(e)) <input type="checkbox"/> 20 <input type="checkbox"/> 30					
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	19 - 20 =	0	x \$ 18.00	\$0.00	
Independent claims	4 - 3 =	1	x \$ 84.00	\$84.00	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$ 280.00		
<b>TOTAL OF ABOVE CALCULATIONS =</b>				<b>\$974.00</b>	
Reduction of 1/2 for filing by small entity, if applicable. A Verified Small Entity Statement must also be					
<b>SUBTOTAL =</b>				<b>\$974.00</b>	
Processing fee of <b>\$130.00</b> for furnishing the English translation later than months from the earliest claimed priority date (37 C.F.R. §1.492(f)) <input type="checkbox"/> 20 <input type="checkbox"/> 30					
<b>TOTAL NATIONAL FEE =</b>				<b>\$974.00</b>	
Fee for recording the enclosed assignment (37 C.F.R. §1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 C.F.R. §§3.28, 3.31). \$40.00 per property.					
<b>TOTAL FEES ENCLOSED =</b>				<b>\$974.00</b>	
				Amount to be refunded:	
				charged	
a. <input checked="" type="checkbox"/> A check in the amount of <u>\$974.00</u> to cover the above fees is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No <u>13-3402</u> in the amount of \$_____ to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>13-3402</u> . A duplicate copy of this sheet is enclosed					
<b>NOTE: Where an appropriate time limit under 37 C.F.R. §§1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. §1.137(a) or (b)) must be filed and granted to restore the application to pending status.</b>					
SEND ALL CORRESPONDENCE TO: Customer Number 23,599 PATENT TRADEMARK OFFICE					
 <b>23599</b>			SIGNATURE  <b>Anthony J. Zelano</b> NAME <u>27,969</u> REGISTRATION NUMBER		
Filed: 7 MARCH 2002 AJZ:kmo					

**IN THE UNITED STATES DESIGNATED/ELECTED OFFICE**

International Application No. : PCT/EP00/08757  
International Filing Date : 8 SEPTEMBER 2000  
Priority Date(s) Claimed : 8 SEPTEMBER 1999  
Applicant(s) (DO/EO/US) : VAN DALEN, Pieter, Adriaan

Title: METHOD FOR E-MAIL COMMUNICATION, APPARATUS THEREFOR AND USE OF SAID METHOD  
AND APPARATUS FOR ELECTRONIC METERING AND FOR HOME AUTOMATION

**PRELIMINARY AMENDMENT**

Commissioner for Patents  
Washington, D.C. 20231

SIR:

Prior to calculating the national fee, and prior to examination in the National Phase of the above-identified International application, please amend as follows:

**IN THE CLAIMS:**

3. (Amended) A method according to claim 1, further comprising the step of :  
J) retrieving the telephone number of the receiver from a database.
5. (Amended) Method according to claim 1 further comprising the step of forwarding an e-mail message from a mail server at the premises of an Internet Service Provider, to the receiver.
6. (Amended) A stand-alone apparatus which is able to perform all the steps presented in claim 1, both as receiver and sender.
7. (Amended) Apparatus which is connected to a computer through as interface (e.g.RS-232), and which is independently able to perform the steps A, B, D, E ,F and G in claim 1, both as receiverand sender.

8. (Amended) A Graphical User Interface application which interfaces with the apparatus presented in which is connected to a computer through an interface (e.g. RS-232), and which is independently able to perform the steps A, B, D, E, F and G in claim 1 and which performs the steps C, I and J presented in previous claim 1.
11. (Amended) Stand-alone apparatus to be installed at the remote location which is able to perform all the applicable steps presented in claim 9, both as receiver and sender.
12. (Amended) Host apparatus to be installed at the central site which is able to perform all the applicable steps presented in claim 9, both as receiver and sender.
16. (Amended) Stand-alone or TeleMail-integrated System Control Unit to be connected to the TeleMail device, and to the mains network, which is able to perform all the applicable steps presented in claim 14.
17. (Amended) Stand-alone or appliance-integrated Appliance Control Unit to be connected to the addressed appliance, and to the mains network, which is able to perform all the applicable steps presents in claim 14.
- 18 (Amended) Method according to claim 14 comprising a unique System Control Unit identifier, and an assignable Appliance Control Unit identifier to uniquely qualify a home automation network, and the member Appliance Control Units connected to it.

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**Made”.**

by J. Zelano, Reg. No. \_\_\_\_\_  
for Applicants

Attorney for Applicants

AJZ:kmo

Filed: 7 March 2002

THE UNIVERSITY OF CHICAGO PRESS

1. *Journal of the American Medical Association*, 1997; 278: 1039-1044.

16. (Amended) Stand-alone or TeleMail-integrated System Control Unit to be connected to the TeleMail device, and to the mains network, which is able to perform all the applicable steps presented in claim 14.
17. (Amended) Stand-alone or appliance-integrated Appliance Control Unit to be connected to the addressed appliance, and to the mains network, which is able to perform all the applicable steps presents in claim 14.
- 18 (Amended) Method according to claim 14 comprising a unique System Control Unit identifier, and an assignable Appliance Control Unit identifier to uniquely qualify a home automation network, and the member Appliance Control Units connected to it.

WO 01/19041

**METHOD FOR E-MAIL COMMUNICATION, APPARATUS THEREFOR AND USE OF SAID  
METHOD AND APPARATUS FOR ELECTRONIC METERING AND FOR HOME AUTOMATION**

Field of the invention

5 The invention relates to a method for e-mail communication, apparatus therefor and use of said method and apparatus for electronic messaging, remote reading of electronic mail and messages, for electronic metering, home automation; electronic payment by cheques and banking applications, and electronic storage of documents.

10 In a first aspect the present invention relates to a method and apparatus which allows Internet-type-communication between users connected via publicly switched telephone networks, both wired and wireless, wherein the Internet as a transport medium is not required.

The primary application thereof is electronic mail. However, the method and apparatus allow many other Internet-type applications. In particular nine important applications have been addressed here:

- 15 - Electronic messaging (similar to the so-called SMS via GSM, however, without the intermediary of a service provider),
- Remote electronic read-out of electronic mail and messages,
- Electronic meter-reading (an application of importance for e.g. utility companies),
- Electronic payment of cheques (and electronic banking applications),
- 20 - Electronic storage and archival of documents (to be extended to making financial and other surveys),
- Home / building automation applications,
- Storage of e-mail messages on a storage device, such as smart cards,,
- Transmittal of data files as e-mail messages, and
- 25 - Dispatching and messaging services.

30 New is that the method and the apparatus allow e-mail transmission between two addresses connected to the traditional public switched telephone network. New is also that signals or data, produced by devices (e.g. utility meters) can be packaged as e-mail messages and transmitted via telephony networks, and/or the Internet. The new inventive applications based on this new e-messaging concept, are:

1. All e-mail based messaging modalities, including remote reading and payment/banking applications;
2. Remote meter-reading;
3. Remote control (e.g. switching on/off) of devices/appliances connected to a
- 35 home/building "intra-network" (As "intra-network" in our invention serves the mains power network).





A sixth aspect of the invention relates to a system whereby as a special retrieving application a home bookkeeping system may be developed.

A seventh aspect of the invention relates to a system and method for storing e-mail messages or other digital information which has been received/stored by the TeleMail device, on a storage device such as smart cards (or other for mobile use practical storage media). The device according to the invention is extendable with a smart card reader. Such smart card stored information can be conveniently used in the case of e.g. cinema/train reservations or e-commerce applications.

An eighth aspect of the invention relates to a system and method to transmit data files as e-mail messages, thereby offering an alternative to proprietary data logging systems.

A ninth aspect of the invention relates to a system and method for dispatching and messaging services, to be applied for instance for truck fleet management. The invention in combination with wireless networks can be an alternative to already existing proprietary radiographic methods.

#### Background of the invention

Currently, communication via e-mail by users which are not permanently connected to the Internet (e.g. homes, small offices) is only possible by making use of the services provided by Internet Service Providers (ISPs). This has two important disadvantages:

sending and receiving e-mail can only be done by making use of a computer, and by accessing the Internet via the server of the ISP;

arrival of new e-mail messages can only be detected by logging in to the server of the ISP.

The first item makes e-mail communication unattractive to many potential users, since a computer poses a relatively large investment, and because still many people find a computer hard to use (even when the computer is fully configured by the vendor).

The second item also makes e-mail via ISPs unattractive, because some time-consuming steps need to be taken to detect the arrival of new (unread) e-mail messages:

- booting the personal computer;
- invoking the operating system (e.g. Microsoft Windows 98);
- starting Internet application software (e.g. Netscape);
- connecting and logging in to the Internet server.

When no new e-mail messages have arrived, this effort has been in vain.

To avoid these difficulties in the prior art, it would be desirable to provide a method and apparatus which makes e-mail communication as easily applicable and intuitive to use as, for example, telephone and facsimile communication, and which does not require involvement of third parties (e.g. an Internet Service Provider), without ruling out the possibility of Internet communication in the conventional manner (i.e. via an Internet Service Provider).

The invention provides therefor a method according to claim 1.

Preferred embodiments of the method are given in claims 2 and 3. The invention is further related to a method according to claims 4 and 5. The apparatuses of the invention are given in claims 6 to 8.

Regarding the second aspect, currently, collection of metering information (e.g. by the electricity company) is either done by persons who visit the customer location in order to read the numbers on the meter, or the customers themselves report the numbers periodically. In the latter case, the numbers still need to be verified by officials of the utility company every once in a while. This has two major disadvantages:

collection of metering information is labor-intensive and therefore costly;

**the metering information cannot be used for load monitoring and anticipation;**

a need exists to provide a method and system which allows utility companies to remotely collect metering information from the customer premises which – depending on the sampling frequency - can also be used for operations management purposes.

In the third aspect an interesting application of the Telemail device can be developed, in connection with the mains power network, which can function as a home automation network.

In the following it is described how the TeleMail device can operate – via signals transmitted along the power network – various appliances in a home or a building. (N.B. The term appliance is used in the most general sense of the word. It may mean a domestic appliance, light bulb, electronic switch, heating system, etc.)

Consequently the following needs are fulfilled:

1. a person who finds himself outside his home / building can switch on/off appliances by sending the relevant information message(s) to his TeleMail device (Either using e.g. another TeleMail device, or e.g. a programmed Palmtop device);

2. the TeleMail device transmits the signal in question to the particular appliances, which will then react (e.g. switch on/off).

## Summary of the invention

The present invention is a method and apparatus (consisting of hardware, firmware, and software) for establishing e-mail communication between two users/devices which both have access to the Public Switched Telephone Network (PSTN). The apparatus has sender and receiver functions.

5       An essential feature of the invention is the use of TCP/IP for communication within the realm of the Public Switched Telephone Network between two TeleMail devices which do not have to be connected to the Internet. This implies that Internet protocol suite applications can be realized in conventional networks. It also means that for a number of applications Internet connectivity and conventional connectivity become merely complementary.

10       As a sender, the appliance offers the possibility of composing, editing, opening, storing and sending e-mail messages through a Graphical User Interface (GUI) application. The messages have a TCP/IP protocol suite compliant structure and format. This includes the possibility of an attachment of data files to the e-mail message.

15       As a sender, the appliance is capable of establishing TCP/IP communication with a similar and compatible receiving device over the PSTN (either through a modem or directly over an ISDN), according to the Point-to-Point Protocol (PPP). Where IP addresses are needed for PPP and TCP/IP communication, dummy addresses are derived from the communicating parties' telephone numbers which are stored in both the sender and receiver apparatus. In a similar manner wireless communication could be realized (e.g. by using GSM as network interface).

20       As a receiver, the appliance is able to respond to an incoming telephone call by going off-hook, and establishing TCP/IP communication with the sender apparatus. Once the data communication is established, the e-mail message can be transferred to the receiver device according to the Simple Mail Transfer Protocol (SMTP) or another Internet Suite Protocol. The apparatus will be in stand-by mode as long as it is switched on.

25       As a receiver, the apparatus is able to store incoming e-mail messages and activate a visual and/or audible indicator that new e-mail has arrived.

      As a receiver the apparatus is able to visually present e-mail messages through a Graphical User Interface application. This includes presentation of data files which can be attached to the e-mail message.

30       The apparatus can be realized as a stand-alone unit which accomodates all the functions needed to fulfil the service of the present invention. Alternatively, the apparatus can be realized as a peripheral device to a computer. Such peripheral would accomodate only those functions which are needed to receive, send and store incoming e-mail messages.

Since the apparatus is conceived to communicate via TCP/IP channels, it can also be employed to make use of other Internet applications, such as World Wide Web (WWW), File Transfer Protocol (FTP), etc.. For such applications, the user would need to log on to the Internet server of an ISP. Connected to the Internet, the user can also make use of the conventional e-mail service, as offered by an ISP.

Because the apparatus is able to accept calls and to receive e-mail messages autonomously, the apparatus can also be called by Internet Service Providers to transfer newly arrived e-mail messages to the premises of the e-mail addressee. Thus, it can contribute to a reduction of required disk space on the server of the ISP, and alert the addressee almost instantaneously of newly received e-mail.

Other possible TeleMail applications in the information society are given hereunder.

The obvious application is that of sending e-mail via the existing telephone networks between addresses connected to these networks. The physical connection and data link is similar to that used for data communications via telephony, the electronic message is transferred according to the TCP/IP protocol suite (in particular SMTP).

In case of e-commerce/e-business communication a display device may be required for convenience. Therefor a TV set or other display device would be appropriate.

It is mentioned here that this message transfer via traditional telephone networks is far more secure than via Internet transfer (may be of importance for e.g. messages containing sensitive data).

The user of a TeleMail device can communicate to Internet addresses, via telephoning an Internet access provider. For e-commerce/e-business applications, a TV set or another display device could be used when the communication requires visualization.

Businesses/Institutions can communicate with TeleMail devices using either Internet or traditional network communications, on the basis of the TCP/IP communication, and the message forwarding included in the TeleMail concept.

This may become quite advantageous e.g. in the following cases:

1. Each physical address, accessible via telephone connectivity can receive e-mail and thus replace traditional mail. This may lead to significant cost savings for businesses/organizations due to the 'short-circuiting' of the traditional mailing system.

2. Each physical address, accessible via telephone connectivity, can be contacted by utility companies for (periodic) meter-reading. As an instance this may be of advantage for electricity companies' load management system and program responsibility. Obviously this will lead to

significant cost savings. This application may require special arrangements to safeguard privacy (see the second aspect of the present invention).

3. The Telemail device can be used as a central server of a home "intranetwork". Such TeleMail device can store a website. Consequently, each appliance at a physical address, connected to the home "intranetwork" is accessible via telephone connectivity, and can be operated via the public switched telephone network by interacting between its TeleMail website and a device connected elsewhere to the telephone network (e.g. palmtop or other TeleMail device). Obviously this will lead to a straightforward operation of appliances in a home (or building) and somebody operating from the outside.

Call-centers are increasingly being contacted also via e-mail. The TeleMail device also provides call-center communication. Also for the functioning of the call-center the TeleMail connectivity is advantageous, since confirmations of agreements can be forwarded on-line.

Businesses are able to improve direct marketing methods since they can combine within their ICT systems results of their data mining and contact customers via TeleMail efficiently and effectively.

Since TeleMail devices can be used like telephony devices, messages can be delivered anywhere/anytime, much more readily than in case of "conventional" e-mail communication which has to go via a PC.

For Businesses/Institutions significant financial benefits may develop since the number required of software licences could be reduced drastically.

The second aspect of the present invention is a method and system according to claims 9-13 (consisting of hardware, firmware, and software) for establishing e-mail communication through the Public Switched Telephone Network (PSTN) between a device installed at the customer premises (called MeterNet Box) and a host at the premises of the utility company (called MeterNet Host), which interfaces with the server of the utility company. The devices at both ends have sender and receiver capabilities, and both have access to the PSTN.

The data communication between Box and Host is established and maintained according to the TCP/IP protocol suite (PPP in particular), the physical connection being provided through a modem or ISDN. The data communication provides a full-duplex path to the applications at both ends.

Two scenarios apply for the operation of the present invention. In the first scenario, the MeterNet Box at the customer location is polled by the MeterNet Host to retrieve metering information (e.g. at regular intervals for billing purposes). In the second scenario, the MeterNet Box

at the customer location autonomously establishes a connection to the MeterNet Host (e.g. for status and error reporting, or upon detection of events specified by the utility company). To avoid costs at the customer's expense in the latter case, the utility company may provide a toll-free number for dial-in connections.

5           Once the data communication between Box and Host (or vice versa) has been established, the Box application can exchange information with the Host application. To identify itself to the Host application, the Box is assigned a unique 32-bit identifier which is also used as (alias) IP address for protocol purposes.

10           Since the utility company can access the metering information without knowledge of the customer, it may be desirable or even required to send a notification to the customer that the information has been collected (either via electronic or postal mail).

          The third aspect TeleControl functionality is an application based on the TeleMail platform according to claims 14-18. Two major functions can be distinguished within the TeleControl application:

- 15           1. centralized, user-definable control over accessible devices;  
          2. providing remote access to the above function.

20           The first function is realized by connecting a home automation control unit to one of the general-purpose interfaces of the TeleMail device. The control-unit can address other units through a power-line modem. These units in their turn can control devices such as light bulbs, switches, heating systems, domestic appliances, alarm systems, etc.. Alternatively, the control unit can be integrated in the TeleMail device enclosure.

25           The user can access the TeleControl functionality through a graphical user interface (GUI) which runs as a TeleMail application. For example, the graphical user interface consists mainly of an HTML file, which can be presented with any compliant web browser application. Through the user interface, the user can invoke Common Gateway Interface (CGI) processes on the TeleMail device, which in their turn control a target device.

          Remote access to the TeleControl (second function) functionality is provided by calling the TeleMail device and loading the TeleControl HTML file into a web browser at the remote location. A personal computer with modem or other TeleMail device can be used for this purpose.

30           Brief Description of the Drawings

In the drawings three sets of figures are given. The same reference numbers have been used for each of the separate sets 1, 2 and 3. 1, 2 and 3 respectively are illustrations of embodiments of the first, second and third aspect of the invention.

Figure 1A is a functional block diagram of the TeleMail system according to the present invention, including two (2) TeleMail devices [T1] and [T2] at the user premises, and a TeleMail device [T3] at the premises of an Internet Service Provider, all with access and connected to the Public Switched Telephone Network [PSTN].

Figure 1B is a functional block diagram of an embodiment of a stand-alone TeleMail device [T4], according to the present invention.

Figure 1C is a functional block diagram of an embodiment of a computer-peripheral TeleMail device [T5], according to the present invention.

Figure 1D is a functional block diagram of an embodiment of a TeleMail device [T6] employed for forwarding e-mail messages from the ISP premises to the user premises, according to the present invention.

Figure 1E is an architecture diagram of the TeleMail embedded software [AS1], according to the present invention.

Figure 1F is a functional block diagram of the TeleMail application software [AS2] for forwarding e-mail messages to a TeleMail device by an Internet Service Provider, according to the present invention.

Figure 1G is a simplified OSI model representation of the TeleMail communication through an ITU-T I.series compliant Integrated Services Digital Network (ISDN).

Figure 1H is a simplified OSI model representation of the TeleMail communication over an ITU-T V.series compliant modem (e.g. V.32, V.34, V.90) over the Public Switched Telephone Network.

Figure 2A provides an overview of the MeterNet system, according to the present invention, including a number of MeterNet Boxes [M1], [M2] and [M3] at the customer premises, and a MeterNet Host [H1] at the premises of a Utility Company with connection to the Utility Company Server, all devices are connected and have access to the Public Switched Telephone Network [PSTN].

Figure 2B is a functional block diagram of an embodiment of a MeterNet Box [M4], according to the present invention.

Figure 2C is a functional block diagram of an embodiment of a MeterNet Host [H2], according to the present invention.



Figure 2D is a flowchart description of the procedure to collect metering information from a single MeterNet Box.

Figure 2E is a flowchart description of the procedure to report information by a single MeterNet Box to a MeterNet Host.

5 Figure 2F is a simplified OSI model representation of the MeterNet communication over an ITU-T V.series compliant modem (e.g. V.32, V.34, V.90) over the Public Switched Telephone Network.

Figure 2G is a simplified OSI model representation of the MeterNet communication through an ITU-T I.series compliant Integrated Services Digital Network (ISDN).

10 Figure 3A provides an overview of the TeleControl system, according to the present invention, including a set of two TeleMail devices [TM1] and [TM2], a TeleControl System Control Unit [SCU], and a number of Appliance Control Units [ACU1], [ACU2], and [ACU3]; all control units are connected to the in-house mains network [MNW]. The Appliance Control Units interface with appliances [APP1], [APP2], and [APP3], respectively. An Application Control Unit may also be  
15 integrated in the appliance enclosure, as illustrated for [ACU3/APP3]. Both TeleMail units are connected to the Public Switched Telephone Network [PSTN]. Both TeleMail units have a display [DIS] as output device for the TeleControl Graphical User Interface. The display of TeleMail device [TM2] is not shown.

Figure 3B is a functional block diagram of an embodiment of a System Control Unit,  
20 according to the present invention.

Figure 3C is a functional block diagram of an embodiment of an Appliance Control Unit, according to the present invention.

Figure 3D is an architectural block diagram of the TeleControl application.

## 25 Detailed Description of the Invention

Figure 1A shows two TeleMail communication devices **101** and **102** of the present invention, and the system in which it operates. Both devices have access to the Public Switched Telephone Network (PSTN) **104** through subscriber loops (**114** and **115**). The sender device **101** opens a switched telephone connection **106** through the PSTN **104**. Once the connection is  
30 established, transfer of the electronic data between the sender and receiver applications commences.

In Figure 1A, a TeleMail device **103** which is employed for forwarding e-mail messages from a Mail Server **112** to a TeleMail device **101** at the customer premises is also depicted. In this

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A number of MeterNet Box (101, 102, 103) and a MeterNet Host device (105) of the present invention, and the system in which it operates is shown in Figure 2A. All devices have access to the Public Switched Telephone Network (PSTN) 104 through subscriber loops (108, 109, 110, and 111). The MeterNet Host device 105 also communicates with a server computer of the utility company (106). In order to establish communication between the MeterNet Box 102 and the MeterNet Host 105, either device can open a switched telephone connection 107 through the PSTN 104. Once the connection is established, transfer of the electronic data between the sender and receiver applications commences.

A block diagram of an embodiment of a MeterNet Box device, according to the present invention, is shown in Figure 2B. Apart from the data transmission 202 and line interfacing 203, all functions are performed by a microprocessor 201. The communication port 202/203 can be an analog modem interface or a digital ISDN interface. The microprocessor is supported by memory 204, which comprises both volatile and non-volatile memory. The microprocessor 201 has a meter interface 206 at its disposal which can be used to collect information from a compatible meter (not depicted). The line interface circuitry 203 is able to detect an incoming call, upon which it alerts the microprocessor 201. The MeterNet Box also comprises a storage unit 205 for a unique permanent 32-bit identifier, which also serves as alias IP address during TCP/IP communication.

A block diagram of an embodiment of a MeterNet Host device, according to the present invention, is shown in Figure 2C. Functionally, the MeterNet Host has two communication ports at its disposal: one for (analog) modem communication 302/303, one for (digital) ISDN communication 304/305. Depending on to which type of subscriber loop the MeterNet Box device is connected, the compatible communication port is selected. Physically, a MeterNet Host can comprise an arbitrary number of either port type. Apart from the data transmission 302/304 and line interfacing 303/305, all functions are performed by a microprocessor 301. The microprocessor is supported by memory 306, which comprises both volatile and non-volatile memory. The microcontroller communicates with a server computer over a server interface 307. The MeterNet Host can either be controlled and configured by software on the server computer, or provide a dedicated interface for this purpose.

A flowchart description of the procedure to collect metering information from a MeterNet Box by a MeterNet Host, according to the present invention, is shown in Figure 2D. Most likely the procedure is executed mainly by a software system. Functionally and physically, the procedure to retrieve information from a MeterNet Box by a MeterNet Host is divided over two subsystems: a database application on the server computer, and embedded software executed by the

microprocessor of the MeterNet Host device. Both subsystems communicate with each other through the server interface of the MeterNet Host device. Please refer to the above description of Figure 2C for details.

The core function of the MeterNet database application consists of a scheduler **401**. The scheduler **401** is responsible for servicing requests to collect information of a MeterNet Box device. The request can be either periodically at user-definable intervals, upon detection of user-definable conditions, or at the user's immediate request. A scheduler interface **413** provides access to the pending requests (e.g. for cancellation of a request). Once a request is serviced it is referred to as a job. A job also has knowledge of the information that needs to be collected from the addressed MeterNet Box. A job starts (step **402**) with the retrieval of a telephone number and line interface type (POTS or ISDN) of the addressed MeterNet Box from a database **403**. Both parameters are then transferred to the MeterNet Host device for further processing (step **404**). In the MeterNet Host the job is fed into a job queue, depending on the line type of the addressed MeterNet Box (step **405**). For each line type, an independent job queue is provided.

From the job queue, the jobs are fetched by the next step in the procedure (steps **408** and **409**, for digital and analog line interfaces, respectively). In this step, the MeterNet Host opens a switched telephone connection to the addressed MeterNet Box, requests and receives the information from the addressed MeterNet Box, and terminates the connection. After successful collection of the requested information, the information is transferred to the server (step **410**). The server updates the database with the newly acquired information (step **411**), and schedules the next request (step **412**).

A flowchart description of the procedure to report metering information by a MeterNet Box to a MeterNet Host, according to the present invention, is shown in Figure 2E. Upon detection of an event which was marked as requiring a report to the MeterNet Host (event **501**), the MeterNet Box opens a switched telephone connection to the MeterNet Host (step **502**). The MeterNet Host detects the incoming call (step **503**), and responds by going off-hook (step **504**), after which the data link is initialized (step **505**) in accordance with the Point-to-Point Protocol (PPP). After establishment of the data link, the data is transferred by the MeterNet Box to the MeterNet Host (step **506**). After successful reception, the MeterNet Host triggers the update of the database **510** with the newly acquired information (step **507**). If no further information is needed, the data link (step **508**) and telephone connection (step **509**) are terminated.

Depending on the type of subscriber loop (POTS or ISDN), the protocol stacks differ. Figure 2F shows the protocol stack for POTS, Figure 2G shows the protocol stack for ISDN. The

only difference lies in the physical layer which is a modem in case of POTS, or an ISDN interface directly in case of an ISDN.

A System Control Unit (102) and a number of Appliance Control Units (104, 105, 106) connected to the respective appliances (107, 108, 109), and a TeleMail-based Graphical User Interface (GUI) application (110) of the present invention, and the system in which it operates is shown in Figure 3A. The application 110 runs on the TeleMail device 101; it provides output on the display 104. For reasons of simplicity, in this description the display 104 has touchscreen capabilities, and thus also functions as input device. This does not rule out other TeleMail device-configurations.

Only for remote access, do both TeleMail 101 and 111 devices need to be connected to the Public Switched Telephone Network 112.

The GUI application 110 can be configured to suit the needs of the user. The user can add or remove new appliances. The GUI application will provide a control in the GUI screen for each appliance addressed by the TeleControl application; and provide all necessary underlying software modules (see description of Figure 3D). A number of controls is shown in the GUI application 110 of Figure 3A.

To illustrate the TeleControl functionality, appliance 107 is considered to be a light bulb, which can be switched on or off. If the user wants to change the state of the light bulb 107 (e.g. turn it off), he/she can invoke the GUI application 110, which contains a control for each appliance addressed by the TeleControl application. The user can then activate the respective control in the GUI screen to perform the desired action.

Activation of the appliance control in the GUI screen will cause the GUI application to invoke a CGI process on the TeleMail device. The CGI process will trigger a message to be sent from the TeleMail device to the System Control Unit 102. The System Control Unit will broadcast a message onto the mains network 103, destined for Appliance Control Unit 104.

The message contains the unique identifier of Appliance Control Unit 104, and the instruction that needs to be performed (e.g. "turn off"). Due to the nature of broadcasting all Appliance Control Units (104, 105, 106) will receive the message; only Appliance Control Unit 104 will handle the message, based upon recognition of its identifier.

The user can access the TeleControl application from a remote location by using another TeleMail device 111 to call the TeleMail device at the user premises 101. Once the telephone connection 113 through the Public Switched Telephone Network 112 has been established, the user can load the GUI application into a web browser on TeleMail device 111. Activating the

controls in the GUI, has the same effect as accessing them locally (i.e. on TeleMail device **101**), as described above. Alternatively, also a PC can be utilized to communicate with the home TeleMail device.

A block diagram of an embodiment of a System Control Unit, according to the present invention, is shown in Figure 3B. Apart from the power-line modem functions **202** and mains interfacing **203**, all functions are performed by a microprocessor **201**. The microprocessor is supported by memory **204**, which comprises both volatile and non-volatile memory. The microprocessor **201** has a TeleMail interface **206** at its disposal which is used to receive command message and transmit report from/to the TeleMail device. The mains interface circuitry **203** connects to the mains network. The System Control Unit also comprises a storage unit **205** for a unique permanent network identifier. This identifier is used in combination with the identifiers of the connected Appliance Control Units to uniquely qualify the Appliance Control Units within a home automation network (see below).

A block diagram of an embodiment of an Appliance Control Unit, according to the present invention, is shown in Figure 3C. Apart from the power-line modem functions **302** and mains interfacing **303**, all functions are performed by a microprocessor **301**. The microprocessor is supported by memory **304**, which comprises both volatile and non-volatile memory. The microprocessor **301** has an appliance interface **306** at its disposal which is used to control the connected appliance. The mains interface circuitry **303** connects to the mains network. The Appliance Control Unit also comprises a storage unit **305** for a unique assignable identifier.

An architectural block diagram of the TeleControl application is shown in Figure 3D. The Graphical User Interface **401** consists of controls (**402**, **403**, **404**) to address appliances connected to the home automation network. It also contains a control to access and configure scheduler **406**. The scheduler **406** provides time-based operations on the appliances such as delayed execution of instructions, or at user defined (fixed or irregular) intervals. The appliance controls invoke a related Common Gateway Interface (CGI) process (**407**, **408**, **409**). The CGI processes make use of the System Control Unit device driver **410** to control the appliances addressed by the System Control Unit hardware **411**. The scheduler **406** also makes use of the same CGI processes (**407**, **408**, **409**) to perform its functions.



**CLAIMS**

1. A method for establishing e-mail communication between two users/devices who/which both have access to the Public Switched Telephone Network, without the need of being connected to the Internet, comprising the steps of:

A) establishing the data link, and PPP connection between the sender and receiver application; and

B) transferring the e-mail message(s) to the receiver device over TCP/IP.

2. A method according to claim 1, further comprising the steps of:

C) composing one or more electronic mail messages through a Graphical User Interface application;

D) setting up a telephone connection to receiver device;

E) acceptance of the call by the receiver device;

F) storage of the e-mail message(s) on the receiver device;

G) termination of the data link and telephone connection;

H) perceptible (e.g. visual and/or audible) indication that an e-mail message has been received by the receiver application;

I) visual presentation of the e-mail message (including attached files) by the receiver Graphical User Interface application.

3. A method according to claim 1 or 2, further comprising the step of:

J) retrieving the telephone number of the receiver from a database;

4. A method of deriving an alias IP address from the telephone number, whereby the alias IP address is derived from a telephone number (including area and country codes) as follows:

- the decimal telephone number (including area and country codes) is converted to a hexadecimal identifier;

- the least significant four (4) bytes of the converted telephone number are used as alias IP address;

- if the converted telephone number has a length of less than 4 bytes, it is extended with leading zeros.

5. Method according to one of the previous claims 1-4, further comprising the step of forwarding an e-mail message from a mail server at the premises of an Internet Service Provider, to the receiver.

6. A stand-alone apparatus which is able to perform all the steps presented in one of the previous claims 1-5, both as receiver and sender.

7. Apparatus which is connected to a computer through an interface (e.g. RS-232), and which is independently able to perform the steps A, B, D, E, F and G in the previous claims 1-3, both as receiver and sender.

8. A Graphical User Interface application which interfaces with the apparatus presented in claim 7, and which performs the steps C, I and J presented in the previous claims 1-3.

9. Method of establishing communication according to claim 1 from a central host to devices at remote locations, all with access to the Public Switched Telephone Network (PSTN), in order to collect information from meters, comprising the steps of:

- a) setting up a telephone connection from the central host to the device at the remote location;
- b) acceptance of the call by the receiver device;
- c) establishing the data link, and PPP connection between the sender and receiver application;
- d) transfer the information to the host device over TCP/IP;
- e) Termination of the data link and telephone call;
- f) updating of the database by the host with the received information.

10. Method of establishing communication according to claim 1 to a central host by devices at remote locations, all with access to the Public Switched Telephone Network (PSTN), in order to transfer information from meters to the central host, comprising the steps of:

- a) setting up a telephone connection to the central host by the device at the remote location;
- b) acceptance of the call by the host device;
- c) establishing the data link, and PPP connection between the sender and receiver application;
- d) transfer the information to the host device over TCP/IP;
- e) termination of the data link and telephone call;
- f) updating of the database by the host with the received information;

11. Stand-alone apparatus to be installed at the remote location which is able to perform all the applicable steps presented in claims 9 and 10, both as receiver and sender.

g) closing of the TeleControl Graphical User Interface program;

h) independent background execution of the scheduled actions by the Scheduler function, as described in steps F) through H) of claim 1.

16. Stand-alone or TeleMail-integrated System Control Unit to be connected to the TeleMail device, and to the mains network, which is able to perform all the applicable steps presented in claims 14 and 15.

17. Stand-alone or appliance-integrated Appliance Control Unit to be connected to the addressed appliance, and to the mains network, which is able to perform all the applicable steps presented in claims 14 and 15.

18. Method according to claims 14 – 17 comprising a unique System Control Unit identifier, and an assignable Appliance Control Unit identifier to uniquely qualify a home automation network, and the member Appliance Control Units connected to it.

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- (71) Applicant (for all designated States except US): **VAN DALEN MANAGEMENT B.V.** [NL/NL]; Blokvenlaan 47, NL-5581 GM Waalre (NL).
- (74) Agent: **BRANTS, Johan, Philippe, Emile**; De Clercq, Brants & Partners CV, E. Gevaertdreef 10a, B-9830 Sint-Martens-Latem (BE).
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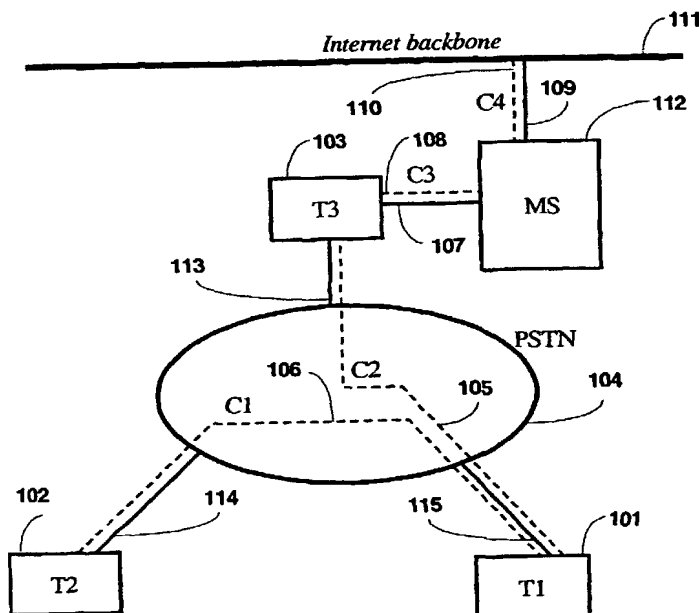
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(54) Title: METHOD FOR E-MAIL COMMUNICATION, APPARATUS THEREFOR AND USE OF SAID METHOD AND APPARATUS FOR ELECTRONIC METERING AND FOR HOME AUTOMATION



(57) Abstract: The invention relates to a method for establishing e-mail communication between two users/devices who/which both have access to the Public Switched Telephone Network, without the need of being connected to the Internet. The invention further relates to an apparatus therefor and use of said method and apparatus for electronic metering and for home automation.

WO 01/19041 A3

WO 01/19041 A3



*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

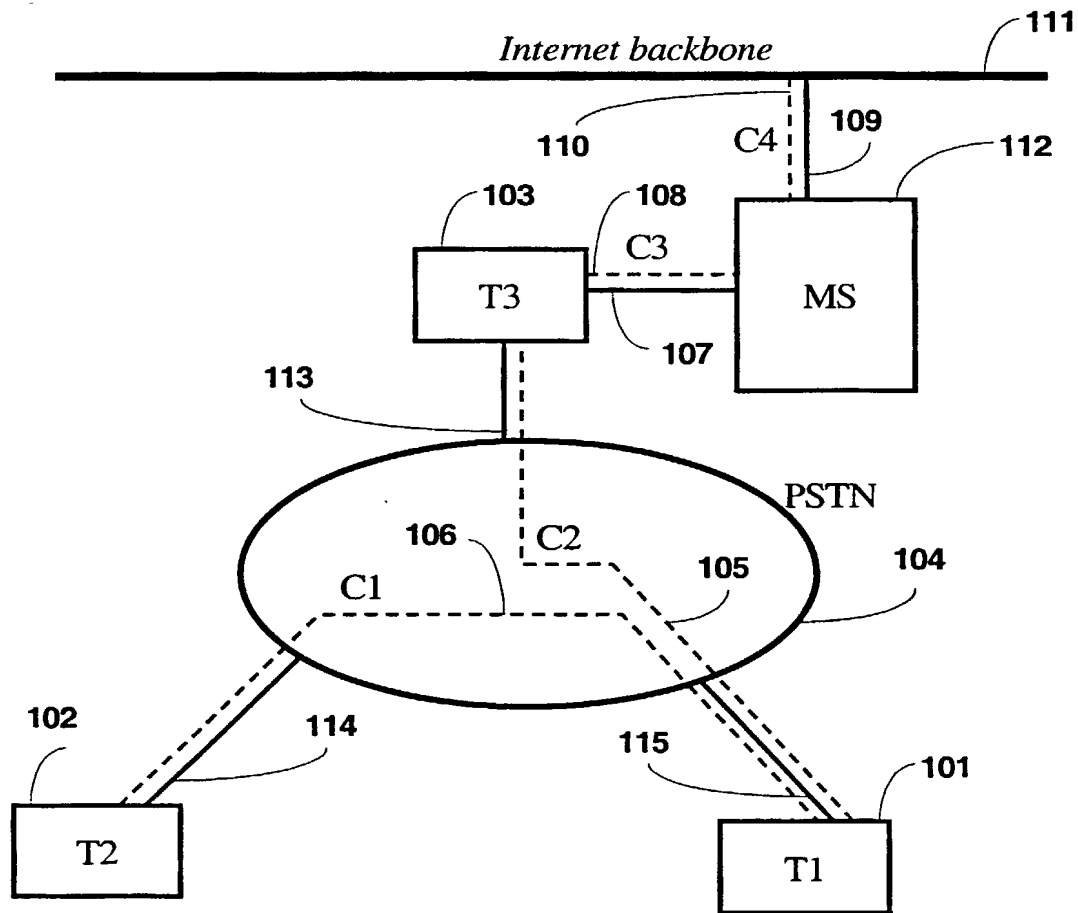


Figure 1A

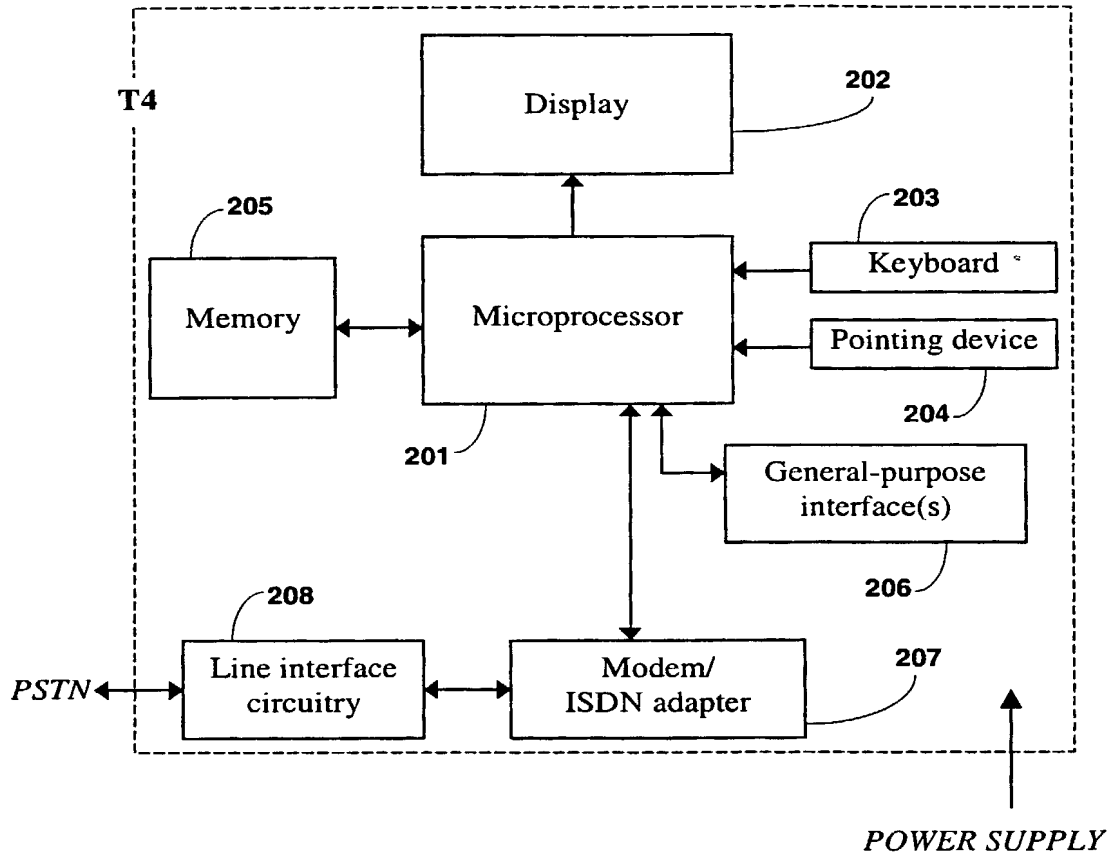


Figure 1B



3/19

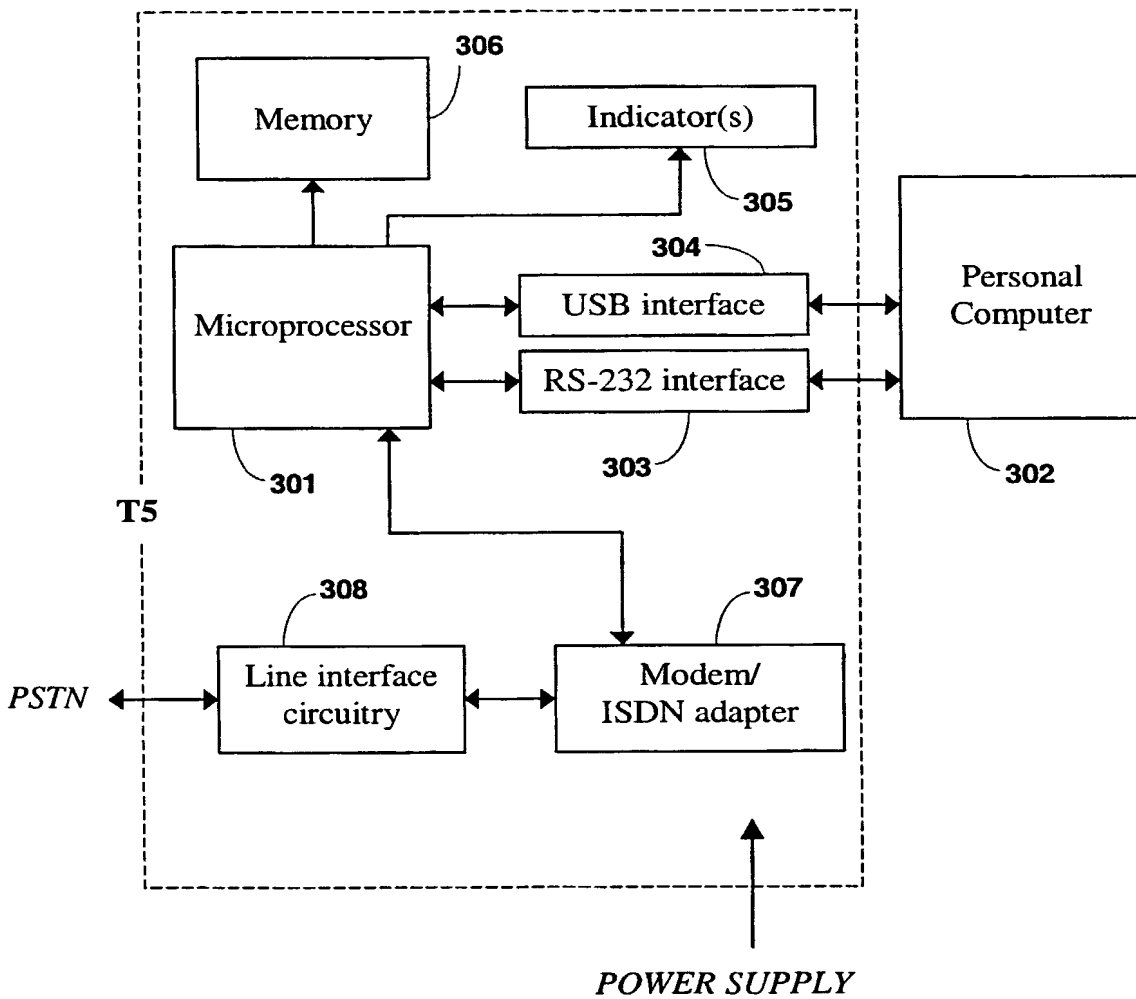


Figure 1C

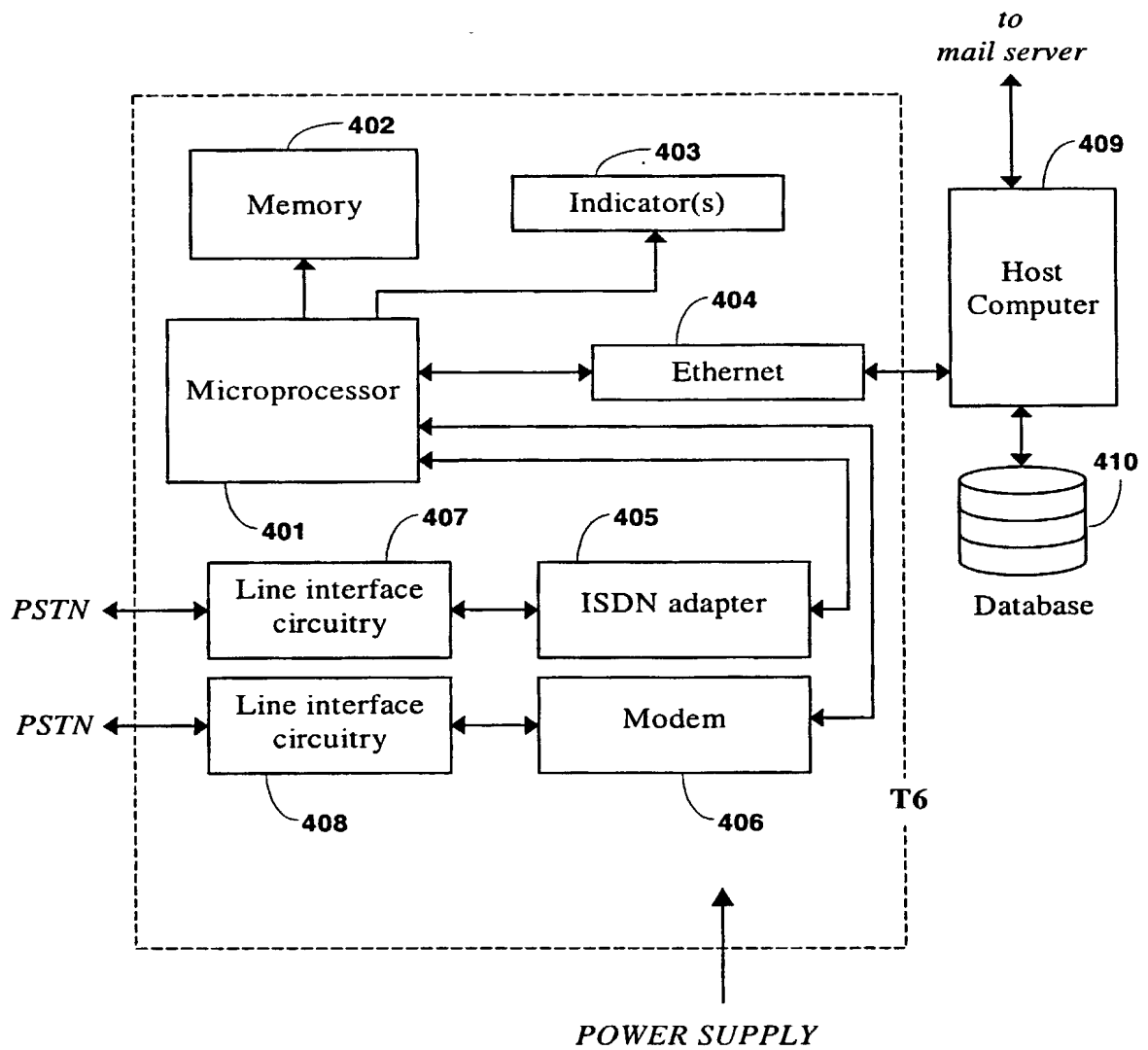


Figure 1D

5/19

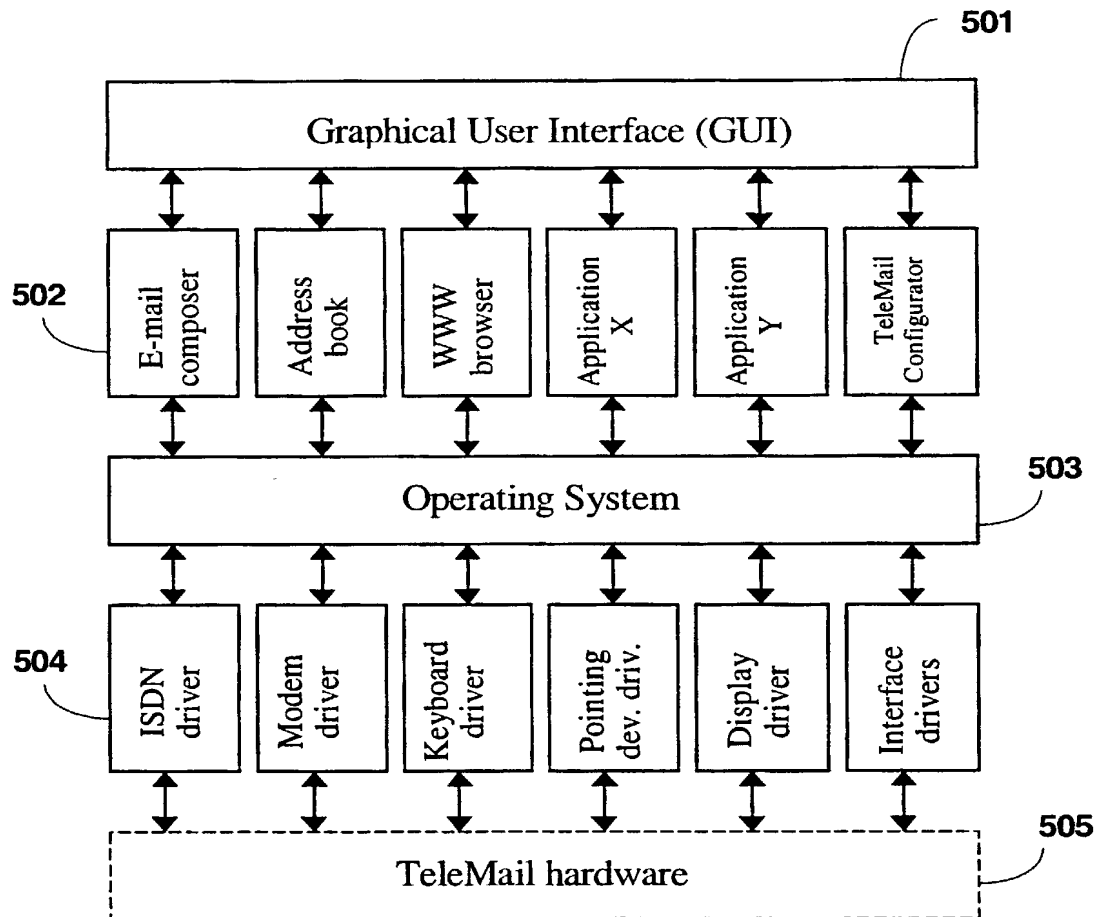


Figure 1E

6/19

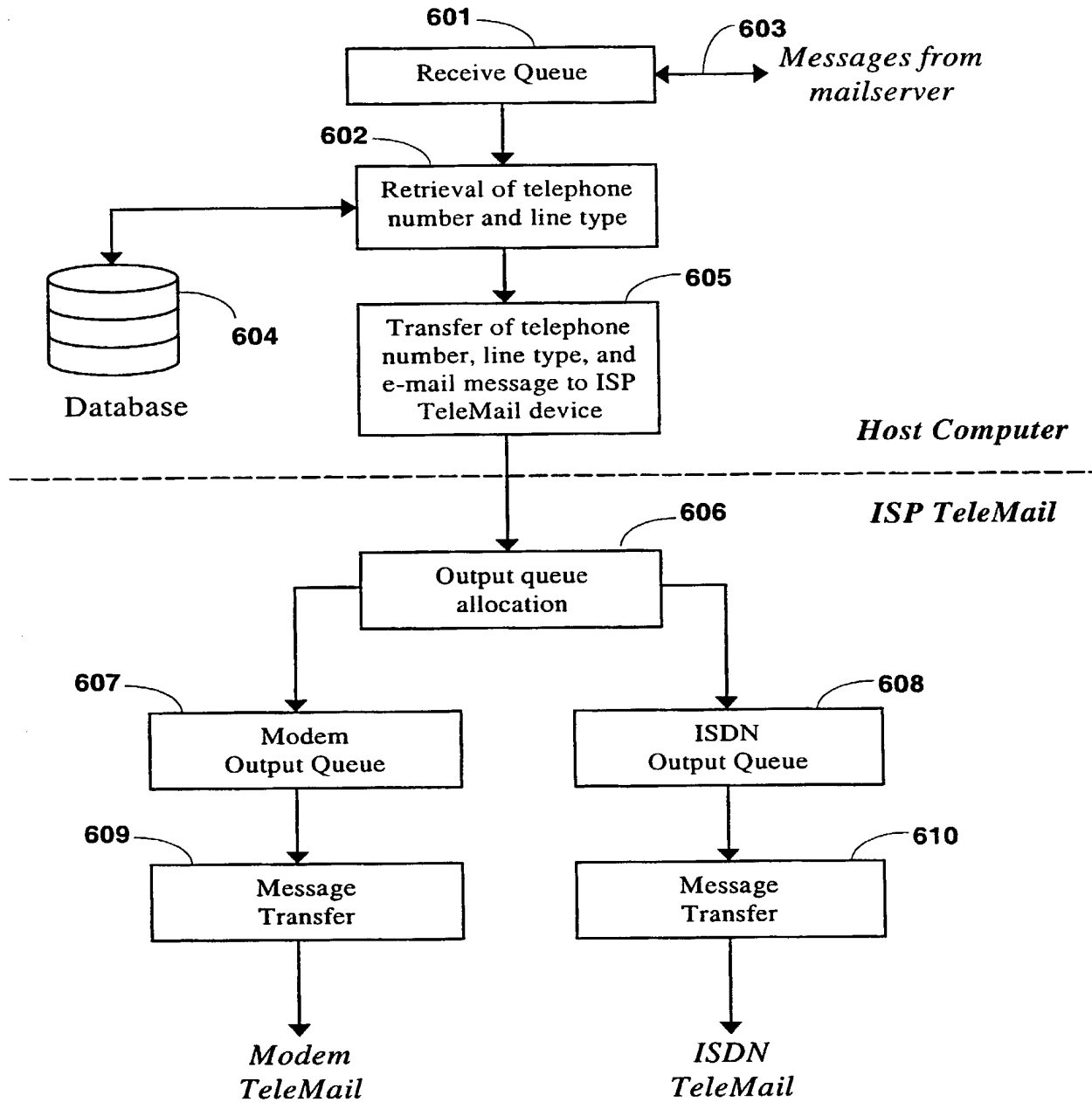


Figure 1F

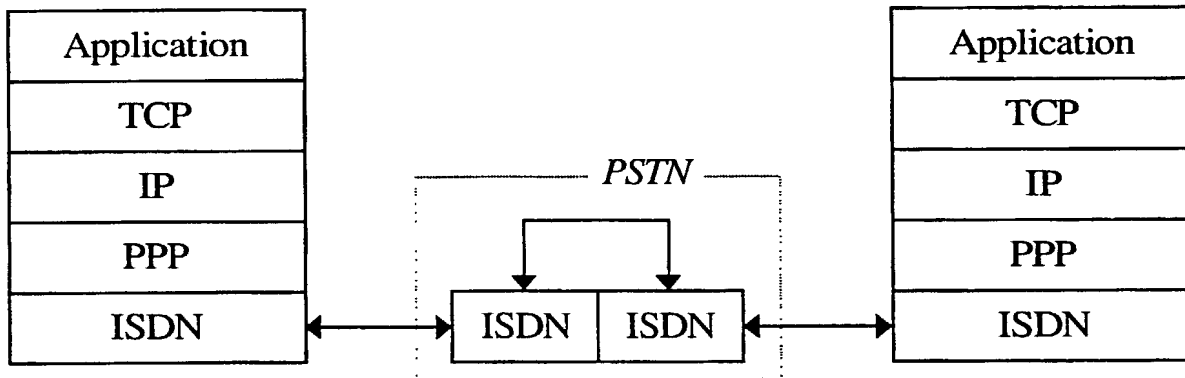


Figure 1G

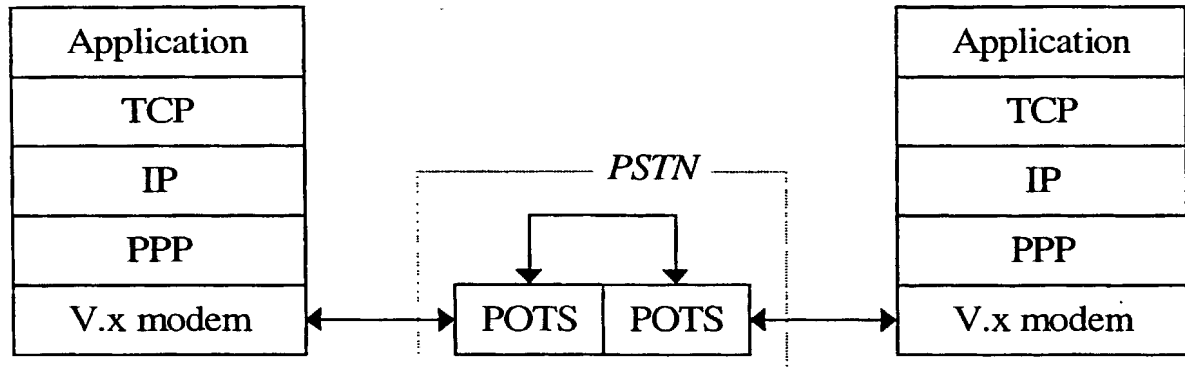


Figure 1H

9/19

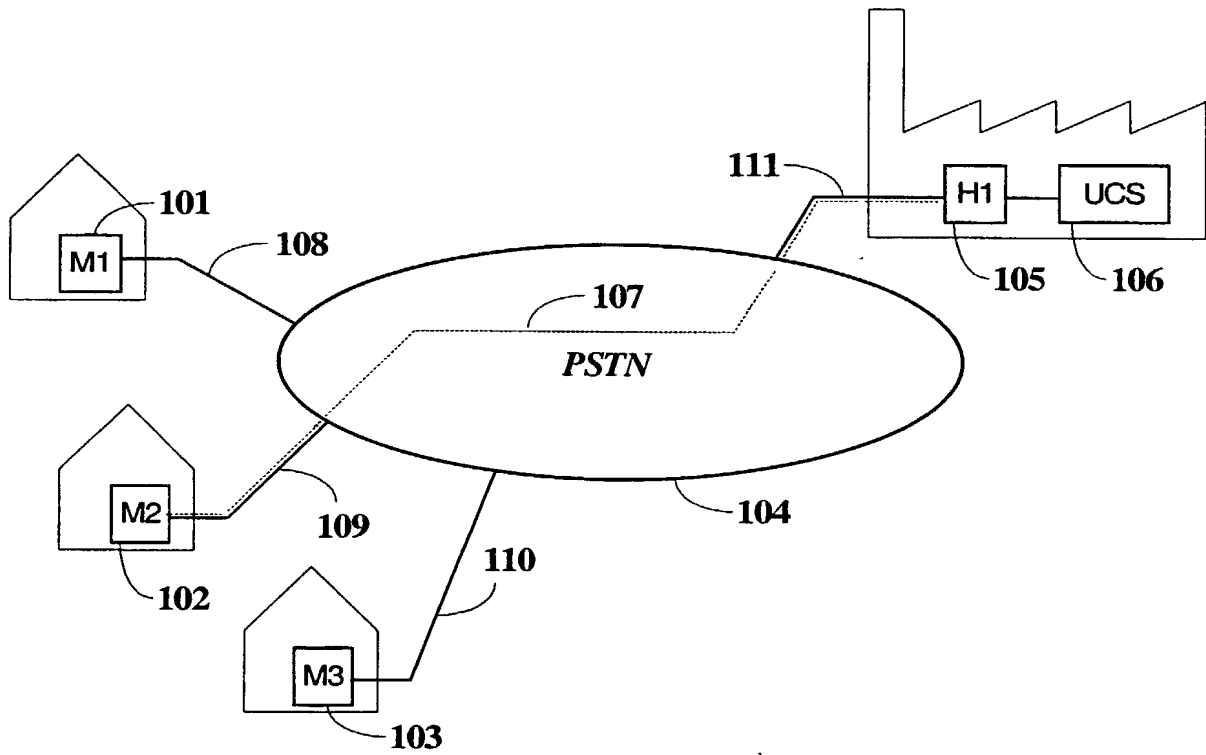


Figure 2A

10/19

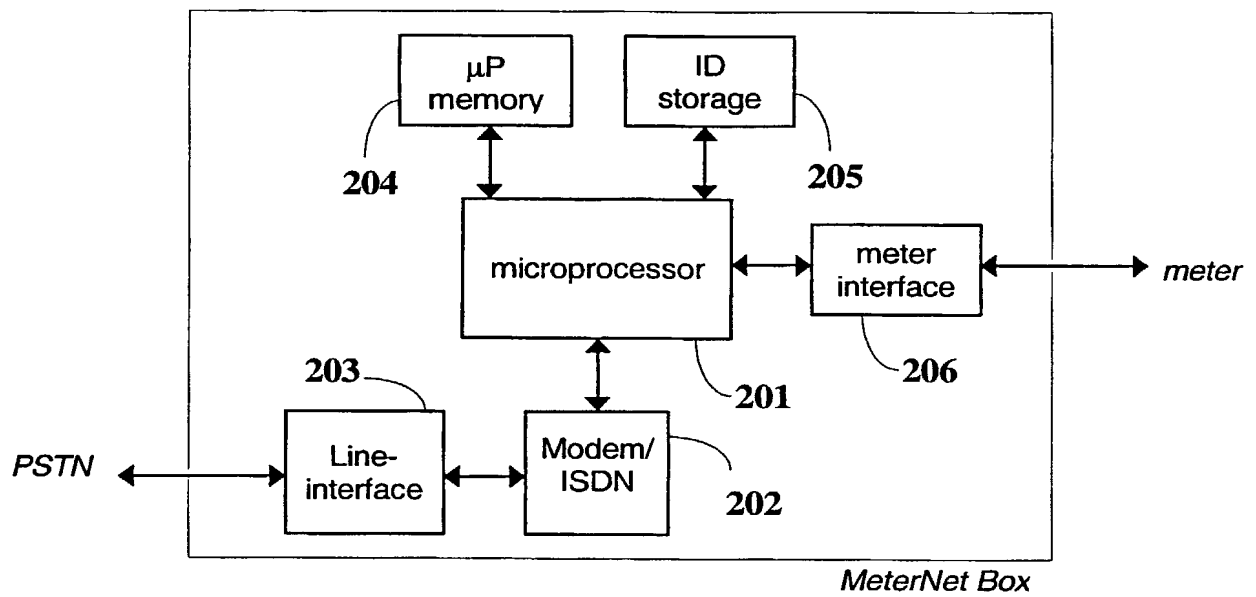


Figure 2B



11/19

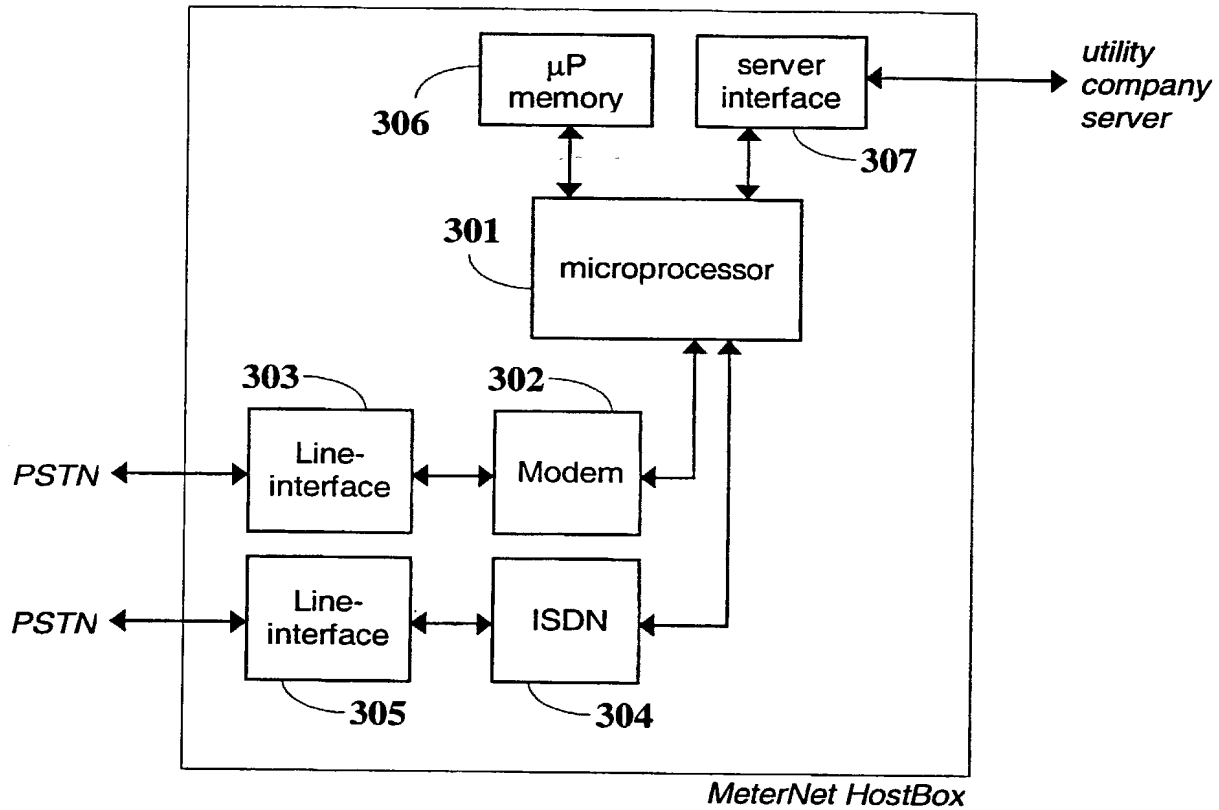
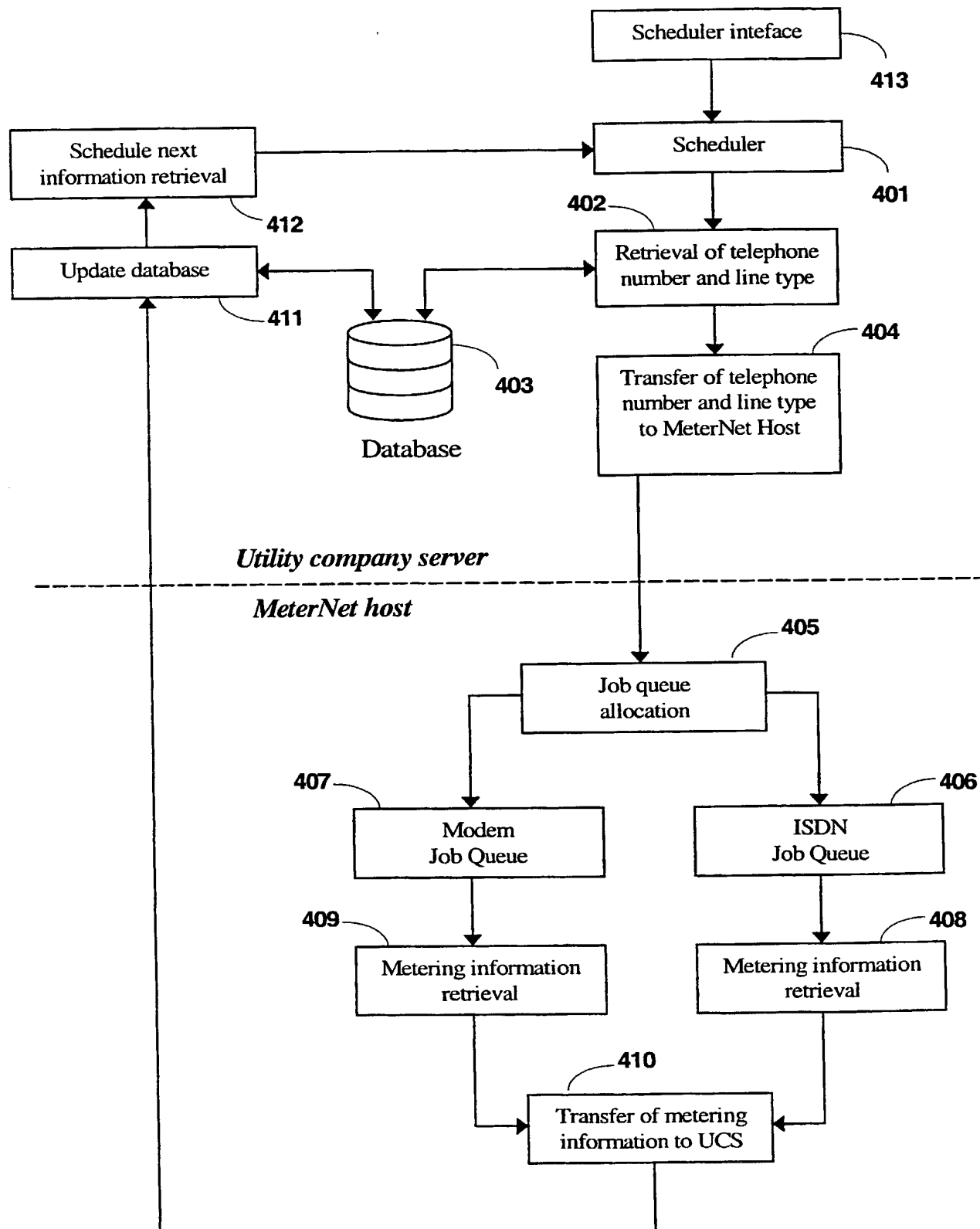


Figure 2C

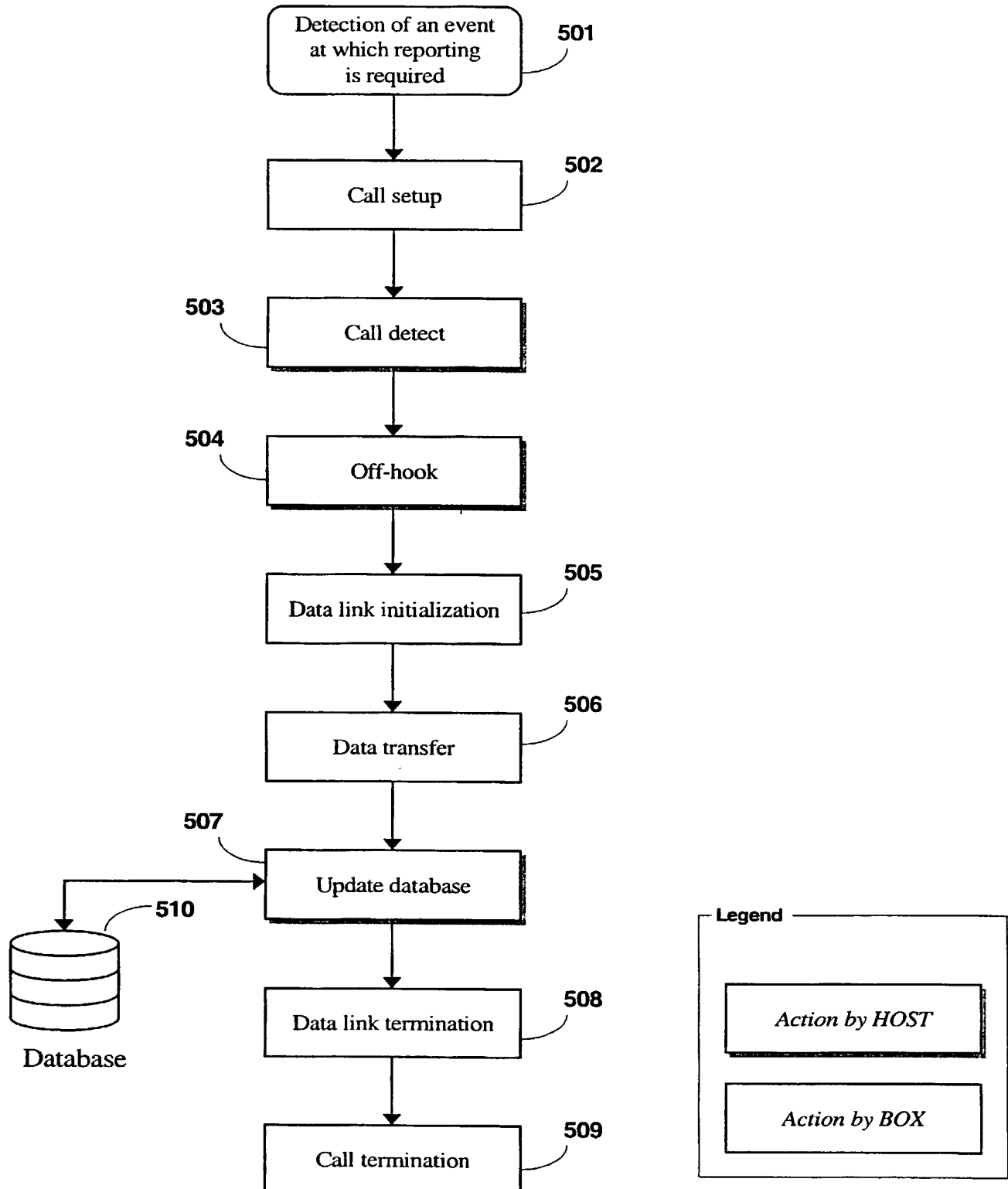
12/19

Figure 2D



13/19

Figure 2E



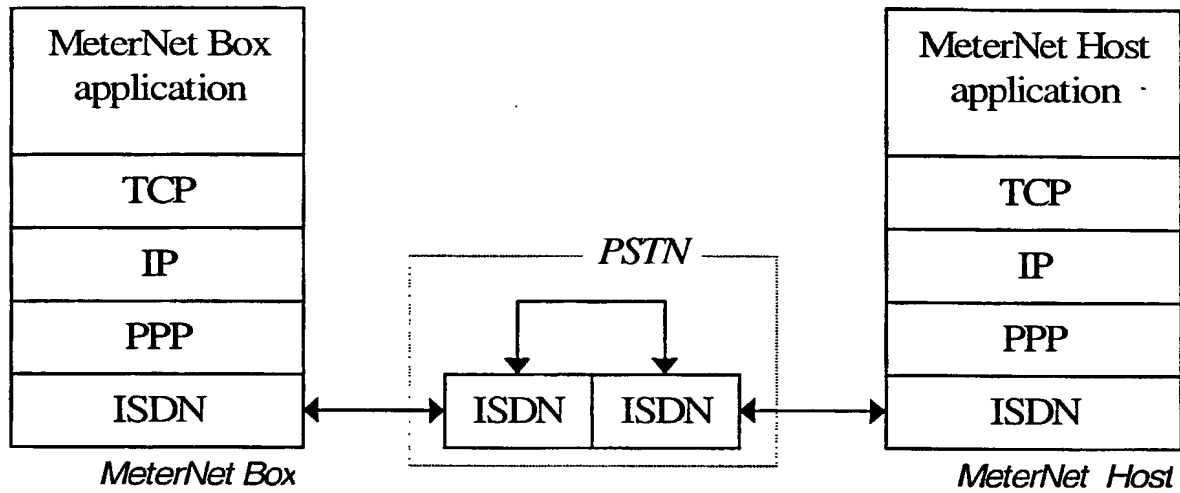


Figure 2F

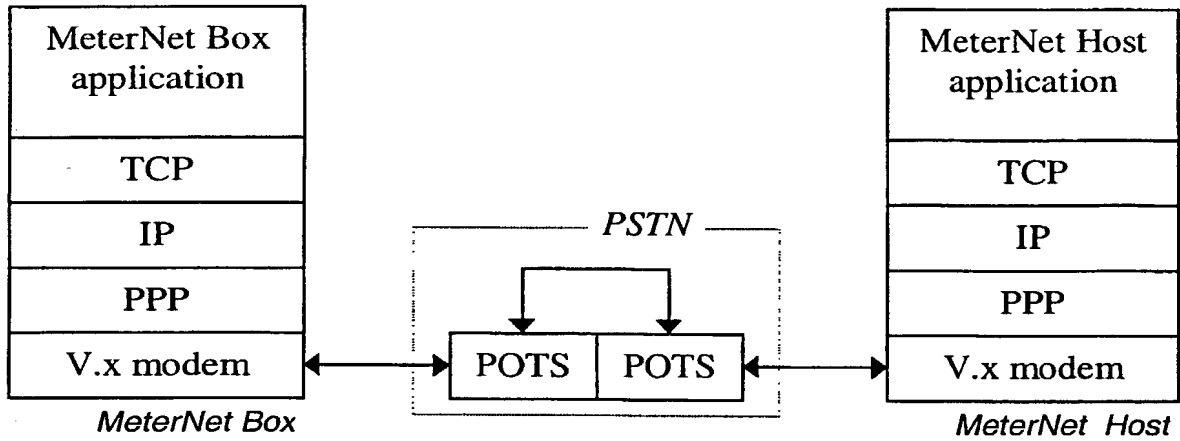


Figure 2G



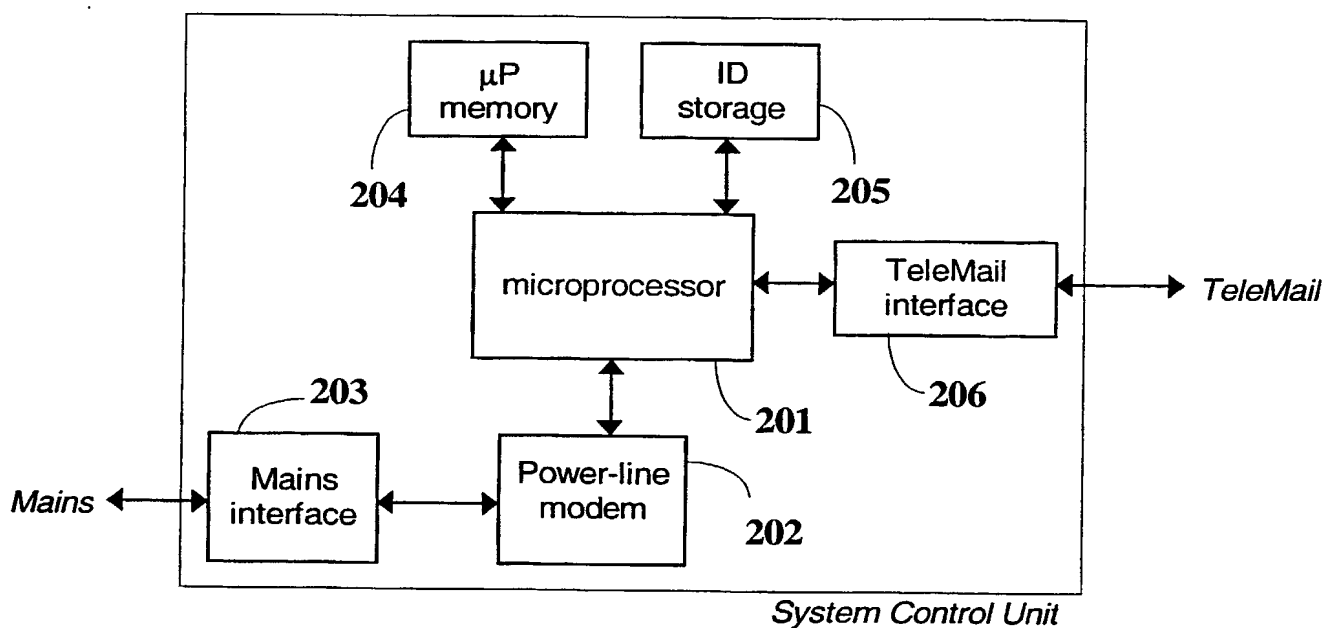


Figure 3B

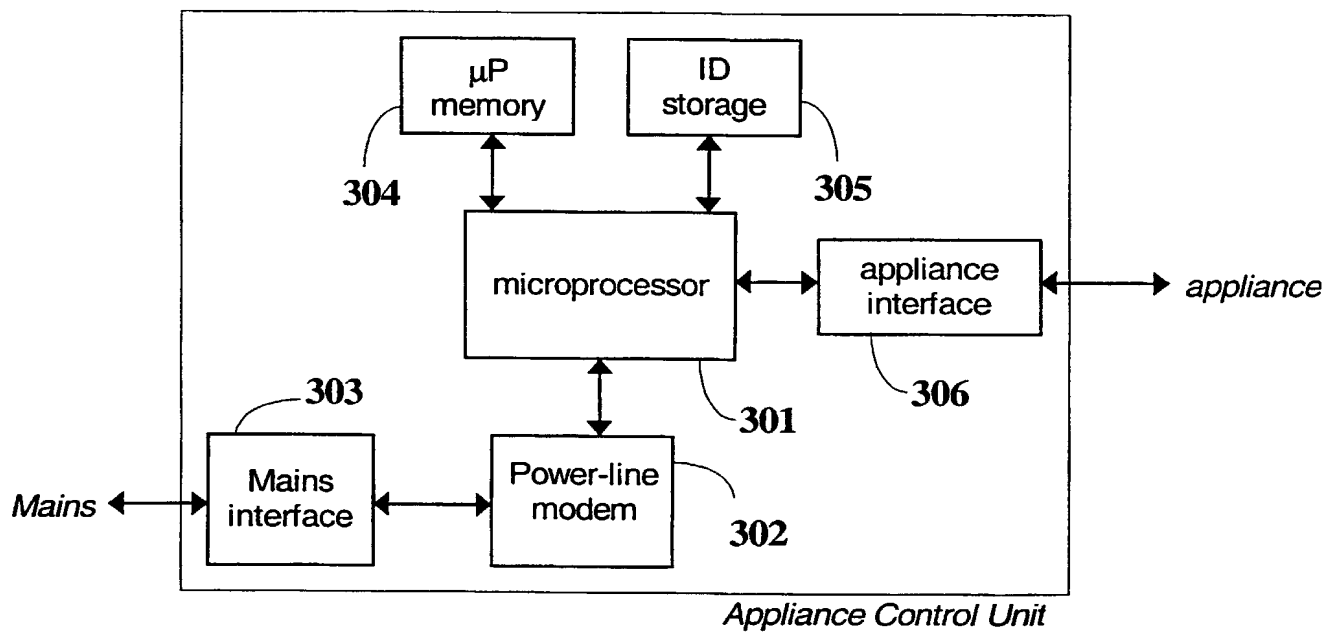


Figure 3C



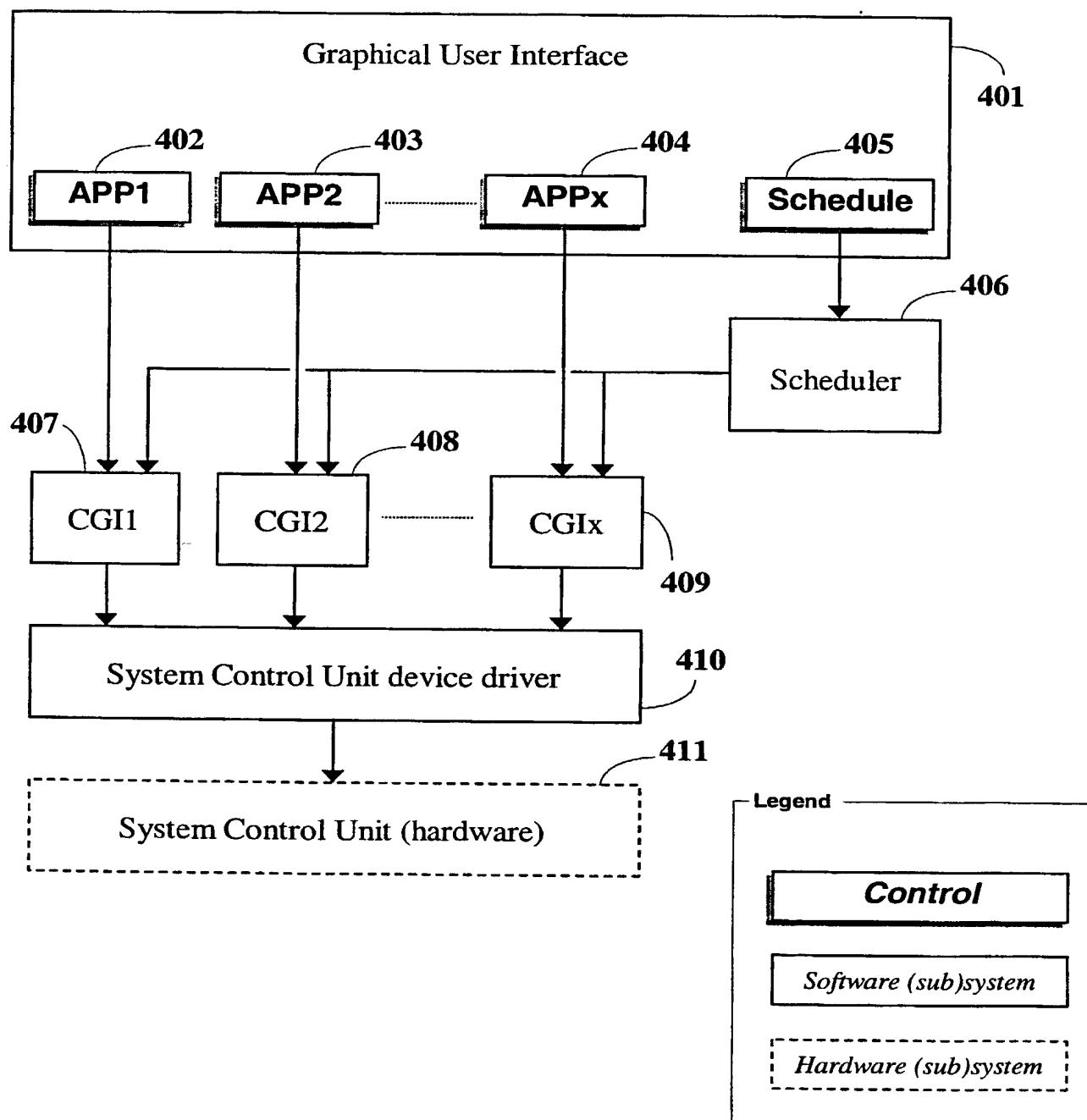


Figure 3D

**DECLARATION FOR PATENT APPLICATION**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**METHOD FOR E-MAIL COMMUNICATION, APPARATUS THEREFOR AND USE OF SAID METHOD AND APPARATUS FOR ELECTRONIC METERING AND FOR HOME AUTOMATION**

the specification of which

☐ is attached hereto

☒ was filed on 8 SEPTEMBER 2000 as United States Application Number or PCT International Application Number PCT/EP00/08757 and (if applicable) was amended on \_\_\_\_\_

I hereby authorize our attorneys to insert the serial number assigned to this application.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR §1.56.

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 USC §119			
APPLICATION NO.	COUNTRY	DAY/MONTH/YEAR FILED	PRIORITY CLAIMED
99202880.3	EP	8 SEPTEMBER 1999	YES

I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below.

PROVISIONAL APPLICATION(S) UNDER 35 U.S.C. §119(e)	
APPLICATION NUMBER	FILING DATE

I hereby claim the benefit under 35 U.S.C. §120 of any United States application, or §365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. §112.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR §1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

PRIOR U.S./PCT INTERNATIONAL APPLICATION(S) DESIGNATED FOR BENEFIT UNDER 37 U.S.C. §120		
APPLICATION NO.	FILING DATE	STATUS — PATENTED, PENDING, ABANDONED

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith: I. William Millen (19,544); John L. White (17,746); Anthony J. Zelano (27,969); Alan E.J. Branigan (20,565); John R. Moses (24,983); Harry B. Shubin (32,004); Brion P. Heaney (32,542); Richard J. Traverso (30,595); John A. Sopp (33,103); Richard M. Lebovitz (37,067); John H. Thomas (33,460); Catherine M. Joyce (40,668); Nancy J. Axelrod (44,014); James T. Moore (35,619); James E. Ruland (37,432); Jennifer J. Branigan (40,921) and Robert E. McCarthy (46,044)

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of sole or first inventor (given name, family name)	
Pieter VAN DALEN	
Signature <i>P. van Dalen</i>	Date April 30, 2002
Residence	Citizenship
GM Waalre, Netherlands	Netherlands NLX
Post Office Address Blokvenlaan 47, NL-5581 GM Waalre, Netherlands	
Full Name of additional joint inventor (given name, family name)	
Signature	Date
Residence	Citizenship
Post Office Address	
Full Name of additional joint inventor (given name, family name)	
Signature	Date
Residence	Citizenship
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Full Name of additional joint inventor (given name, family name)	
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Full Name of additional joint inventor (given name, family name)	
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